

REMARKS

Claim Rejections Under 35 USC §103(a)

Claims 25-39 and 47, 48 and 51-53 have been rejected under 35 USC §103(a) as being unpatentable over Hembree (US Patent No. 5,783,461) in view of Pedder (US Patent No. 5,717,245) and Gilmour et al. (US Patent No. 5,391,917).

Claims 49 and 50 have been rejected under 35 USC §103(a) as being unpatentable over Hembree (US Patent No. 5,783,461), Pedder (US Patent No. 5,717,245) and Gilmour et al. (US Patent No. 5,391,917) as applied to claims 25 and 47 above, and further in view of Rostoker et al. (US Patent No. 6,181,011).

Summary of the Invention

Claims 25-39 and 47-53 are directed to a "semiconductor component". The component includes a substrate 10 (Figure 2), and a conductive layer 14 (Figure 2) substantially covering a surface of the substrate 10. In addition, the component includes conductors 16 (Figure 2) on the substrate 10, and a semiconductor die 20 (Figure 2E, 3A or 7) in electrical communication with the conductors 16.

Each conductor 16 is defined by a pair of grooves 15 (Figure 2) which comprise ablated portions of the conductive layer 14. As shown in Figure 2C, the conductors 16 comprise portions of the conductive layer 14 separated by the grooves 15, and by remaining portions of the conductive layer 14 having edges defined by the grooves 15. As shown in Figure 2, each conductor 16 can include a bond pad 18 (pads or contacts in the claims) configured for flip chip mounting or wire bonding the die 20. Each conductor 16 can also include a contact pad 22 (contacts in the claims) configured for electrical connection to outside circuitry. In the case of wire bonding, an opening 40

(Figure 3A) can be laser machined in the conductive layer 14 for attaching the die 20 to the substrate. As shown in Figure 5A, the substrate 10BGA can also include conductive vias 58 in electrical communication with the conductors 16BGA, and contact balls 66 in electrical communication with the conductive vias 58.

35 USC §103 Rejections over Hembree in view of Pedder and Gilmour et al.

In order to overcome the rejections, independent claims 25, 30, 35, 47 and 52 have been amended to emphasize structural and functional features of the component. In addition, the "ablated portions of the conductive layer" recitations have been removed from the amended independent claims.

Amended independent claim 25 recites "a conductive layer comprising a plurality of first portions and a plurality of second portions substantially covering the surface". In Figure 2B, the conductive layer 14 substantially covers the substrate 10 as only the substrate under the grooves 15 remains uncovered. In addition, the conductive layer 14 includes "first portions" which are the conductors 16, and "second portions" which are the segments of the conductive layer between the conductors 16. Antecedent basis for the "portions of the conductive layer" recitations is contained on page 8, lines 13-15 of the specification.

Amended independent claim 25 also recites "a plurality of conductors on the surface comprising the first portions of the conductive layer separated from one another by the second portions of the conductive layer". Amended independent claim 24 also recites "a plurality of grooves in the conductive layer defining a size, a spacing and a shape of the conductors and the second portions of the conductive layer". Antecedent basis for the size, spacing and shape recitation is contained on page 2, lines 24-26 of the specification.

These features are shown in Figure 2, wherein the conductors 16 (the first portions of the conductive layer 14) are defined by grooves 15 on either side. In addition, the conductors 16 are separated from the second portions of the conductive layer 14 on either side by the grooves 15.

Amended independent claims 30, 35, 47 and 52 include recitations similar to the above quoted recitations of claim 25. In addition, amended independent claim 30 states that the conductive layer comprises a "metal foil". Amended independent claim 35 recites "each conductor defined by a pair of grooves and separated from an adjacent conductor by a second portion of the conductive layer having an edge defined by a groove". Amended independent claim 47 recites "each conductor having opposing edges defined by a pair of grooves, each conductor having portions of the conductive layer on either side separated from the opposing edges by the pair of grooves". Amended independent claim 52 recites "each conductor comprising a first portion of the conductive layer separated from an adjacent conductor by a groove and a second portion of the conductive layer".

The Hembree reference discloses a temporary semiconductor package for testing semiconductor dice. The package 10 (Figure 1) includes an interconnect 16 having raised contact members 60 (Figure 4) for making electrical connections with bond pads 62 on the die 12 (column 6, lines 27-30). In addition, the interconnect 16 includes conductive layers 68 (Figure 5) on the contact members 60, and conductive traces 58 (Figure 4) in electrical communication with the conductive layers 68 (column 6, lines 37-40).

Although the conductive traces 58 in Hembree can comprise a conductive layer, and perform the same function as the presently claimed conductors (i.e., signal transmission), the conductive traces 58 do not "substantially cover" the interconnect 16. Admittedly, the

conductive traces 58 cover some portion of the interconnect 16. However, as shown in Figure 1 of Hembree, the interconnect 16 has a size which is about the same as that of a die 12. On the other hand, as shown in Figure 4 of Hembree, the conductive traces 58 are much smaller than the die 12, and cover only a small portion of the interconnect 16.

In addition, there is no conductive layer in Hembree having "first portions", which make up the conductive traces 58, and "second portions", which separate the conductive traces 58. Although the conductive traces 58 in Hembree could comprise first portions of a conductive layer, the material between the conductive traces 58, or the second portions of the conductive layer, has been removed. In the present case the remaining portions of the conductive layer protect and rigidify the substrate.

Still further, in Hembree there are no "grooves" which define the conductive traces 58. In this regard the Examiner has equated the spaces between the conductive traces 58 as being equivalent to the presently claimed grooves. However, the Random House Webster's College Dictionary defines a groove as a long, narrow cut or indentation in a surface. The spaces between the conductive traces 58 in Hembree are not narrow relative to their length. Rather the width of the spaces in some cases is larger than their length. See for example the space in Figure 4 of Hembree in the middle which is between the patterns of conductive traces 58 on either side.

The advantage of the present grooves 15 (Figure 2B) is that they can be formed using a laser machining process, and can be very narrow and have precise dimensional tolerances. This permits the conductors 16 (Figure 2A) to also be very narrow and have precise dimensional tolerances (size, spacing and shape in the claims).

Pedder discloses a conductive layer (30-Figure 3, 80-Figures 8 & 9) which has been equated to the presently

claimed conductive layer. In addition, Pedder discloses microstrip trimming stubs 94, 95, which have been equated to the presently claimed conductors.

Gilmour et al. was cited as teaching a conductive layer (lines 5 in Figures 3-6), and vias (21 in Figures 3-6) having a spacing of 40 microns.

Applicant submits that one skilled in the art at the time of the present invention would have no incentive to combine Pedder and Gilmour et al. with Hembree. The Office Action states the incentive as "so that the resonance characteristics and electrical performance of the interconnection can be improved in Hembree's component". However, the interconnect 16 in Hembree, particularly the conductive traces 58, do not function in the same manner as the resonator 60 (Figure 5) in Pedder, which is a passive circuit element, such as a filter.

Pedder states at column 6, line 60 to column 7, line 4: "In order to achieve tighter tolerances, a combination of triplate and surface microstrip constructions (not shown) are employed to allow trimming and tuning of these components after manufacture. This is realized by arranging for the majority of the length of a resonator or filter element to be defined in the triplate format described above, but completing the length with the addition of a short length of microstrip formed in the upper or lower metallisation 30, 32. This measure takes part of the element onto the package surface, where laser or abrasive trimming may be employed to adjust the length and resonant behavior of the line."

In order to improve the resonance of the conductive traces 58 in Hembree, one would need to incorporate a resonator element into the interconnect 16, as it is not a matter of simply trimming a length of the conductive traces 58 with a laser. In the present component, the conductive layer and the laser machined grooves define and separate the conductors.

In addition to there being no incentive to combine the references, the references do not disclose all of the features of the present claims. In this regard, Figure 2 of the present application shows the layout of the conductors 16, the grooves 15, and the separating portions of the conductive layer 14 in a plan view. The present claims include limitations on the grooves completely defining the size, spacing and shape of the conductors. As previously argued Hembree does not teach conductors having these features. In Pedder there is no equivalent plan view showing the microstrip trimming stubs 94, 95 as having a size, spacing and shape completely defined by grooves in a conductive layer. Gilmour et al. also does not teach this feature.

35 USC §103 Rejections over Hembree, Pedder, Gilmour et al. and Rostoker et al.

The 35 USC §103 rejections based on Rostoker et al. are traversed as this reference has a priority date of December 19, 1998 which is subsequent to the priority date of the present application. Specifically, the present application is a division of serial no. 09/110,232, which was filed on July 6, 1998 (See Corrected Filing Receipt). Rostoker et al. is therefore not prior art with respect to the present application.

Conclusion

In view of the above amendments and arguments, favorable consideration and allowance of claims 25-39 and 47-53 is requested. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

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